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EXPERIMENTAL FARMS

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POTATO SCAB

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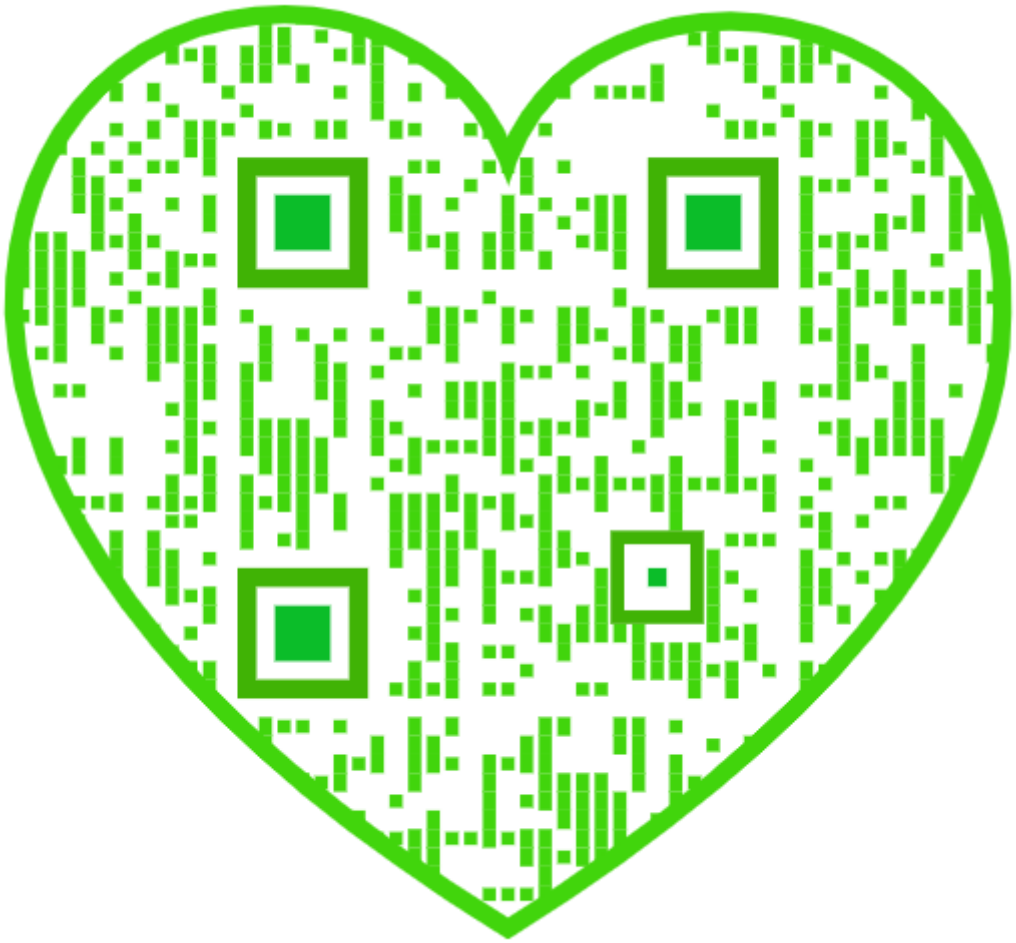
I. COMMON SCAB.

This disease of potatoes is one of the commonest and most widely distributed. It makes the tubers unsightly, and therefore decreases their value for sale purposes—in some cases as much as fifty or even seventy-five per cent.

It takes the form of more or less circular areas on the surface of the tuber, sometimes raised above the general level of the skin, sometimes sunk below. The scabbed spots vary much in size and frequently they are so numerous as to run into each other. The prevalent colour of the scabby spots is brown.

Common Scab is caused by a minute organism to which the name *Actinomyces scabies Güssow* has been given. This organism lives on the skin of the potato tuber, and causes the cells of the skin, when young, to multiply or divide up in an irregular manner, thus forming the scab or pustule instead of a smooth skin.

It has been found that the organism causing scab on potatoes can also attack beet, mangel, turnip, cabbage, and carrot, and probably some other crops as well. It can also live in the soil for five years or longer without any of the above crops.



If the potatoes, when planted, are free from scab and have not been contaminated by coming in contact with tubers bearing the disease, and if the soil and manure are free from the scab organism, the resulting crop of potatoes should be smooth-skinned.

If, however, scab is present on the potatoes planted, or in the soil, the nature of the soil and fertilizers used may either increase or diminish it. Wood-ashes, lime, potash, stable manure of all kinds, and substances of an alkaline nature, will, as a rule, intensify the disease. On the other hand, seaweed and commercial fertilizers either have a tendency to diminish the disease, or, at any rate, do not make it worse.

Heavy moist soils appear to favour the disease, and it is more likely to be prevalent in a wet season than in a dry one.

Green manuring increases the acidity of the soil, and consequently has a tendency to check the disease.

The manure of animals fed on uncooked scabby potatoes will probably carry the disease. Sacks, barrels, etc., which have been used for scabby potatoes will, if used subsequently for clean potatoes, convey the contamination to the latter. Ploughs and other implements may carry infected soil into a clean field. Cellars that have been used for a scabby crop may convey the disease to a crop apparently free from scab, unless they are disinfected.

Disinfection of the above may be carried out as follows:—

Sacks, etc., may be disinfected with boiling water or they may be disinfected in the same way as described below for potatoes. Ploughs, potatc diggers, etc., should first be washed with a stream of water and then sprayed with formalin, 1 pint to a gallon of water.

Cellars should be thoroughly cleaned and the walls and floors washed or sprayed with a fresh lime wash containing one pound of copper sulphate (bluestone) to every 15 gallons of the wash.

Small quantities of potatoes may be disinfected by immersing them in sacks or wooden crates in a solution of commercial formalin—1 pint to 30 gallons of water for two hours, or in a solution of corrosive sublimate (bichloride of mercury), 2 oz. to 15 gallons for 1½ hours. The formalin solution made as directed can be used ten times in succession without loss of strength. The corrosive sublimate is intensely poisonous, and must not be prepared in an iron vessel. The same solution should not be used more than three times in the latter case.

For disinfecting large quantities of potatoes, the formalin gas method is the most convenient. This should be carried out in an air-tight shed, which can be easily constructed out of rough lumber lined with building paper. An estimate must be made of the number of cubic feet inside the building in order to determine the amount of chemicals necessary to use.

The potatoes should not be placed over or within three feet of the generator, and they should be disposed in such a manner that the gas may easily have access to them on all sides. They should be in sacks, or crates, or shallow slat-work bins not more than one foot deep. The amount of potatoes to be disinfected must not be too small in proportion to the size of the disinfecting chamber, as they are liable to be injured in that case, brown sunken spots making their appearance around the eyes. If the tubers have commenced to sprout at the time of fumigation, they are much more likely to be injured by the gas. The potatoes should be kept in the disinfecting chamber for twenty-four to forty-eight hours before the doors are opened and the temperature during this time inside the chamber should not be allowed to fall below 50°F. The tubers should be dry when they are disinfected. The dishes used should have wide bottoms, and should be sufficiently deep to prevent the liquid from bubbling over when the gas is given off. Tin or galvanized iron dishes can be used. Three pints of commercial formalin and 23 oz. of potassium permanganate should be used for 167 bushels of potatoes per 1000 cubic feet of space. The permanganate should be spread in a thin layer on the bottom of the pan, the formalin poured over it and stirred quickly, and then the door should be tightly closed.

Carman No. 3 and Irish Cobbler are said to have some power of resistance to Scab.

Remedies:—

1. Use only clean-skinned potatoes for seed and disinfect them to make sure that any germs adhering to the skin are killed.
2. Disinfect annually all cellars used for storing potatoes. Disinfect all sacks, barrels, etc., before use, unless these are new. Disinfect all implements used in an infected field.
3. Plant potatoes only in land that has not had a crop of potatoes or other crop liable to the disease during the previous five years.
4. Attend carefully to the manures used, and boil all scabby potatoes before feeding to live stock.

II. POWDERY SCAB.

This disease occurs in the Maritime Provinces of Canada, and, like the previous disease, is also caused by a minute organism known as *Spongospora subterranea* Lag. parasitic on the skin of the tuber, and in rare cases also on the roots. The pustules produced on the tuber are more uniform in size and shape than in the case of Common Scab, and are usually darker in colour. The skin of the tuber is slightly raised around the pustules and the central part of the wart or pustule is made up of a powder, which, under the microscope is seen to consist of spore-balls. These spore-balls readily distinguish it from all other potato diseases.

This organism may attack the tubers when they are only as large as a hazel nut. It only attacks the parts of the plant below ground—usually the tubers—and does not infect any other crop but potatoes.

It has been found that the presence in the soil of an excess of lime tends to favour the disease, but it has not yet been determined whether other fertilizers have a similar or opposite effect. An attack of the disease is usually more severe in a moist soil or a rainy district.

The spore-balls can retain their vitality in the soil for at least three years, but how much longer they can live in the soil has not been determined.

Experiments have shown that the spore-balls can pass through the digestive system of pigs, and afterwards infect a potato crop in the manure. Boiling diseased potatoes before feeding to live stock would prevent this.

Sound potatoes, as in the case of Common Scab, may be contaminated by the use of infected cellars, sacks, implements, etc. The same methods of disinfection should be employed as in the case of Common Scab, and the remedies suggested are the same except that a crop of turnips, mangels, etc., can take its place in the rotation as these are not affected by Powdery Scab.

So far as is known at present, all varieties of potatoes are equally susceptible to this disease.